Attachment 1: Supplemental Technical Support for Missouri's Area Recommendations for the 2010 1-hour SO_2 Standard: July 2016 Designations

The state recommended area designations for three parts of the state: the areas surrounding the Sikeston Power Station, Sibley Generating Station, and Ameren Labadie Energy Center. The EPA identified these three areas as meeting the criteria specified in the March 2, 2015 Federal Consent Decree for the next round of SO_2 designations. EPA's February 16, 2016 letter served as notification to the state that EPA intends to modify Missouri's original recommendation. This technical analysis provides detailed information that supports Missouri's original recommendation as well as addresses the concerns and issues raised by EPA in the received letter and TSD.

We have performed additional analyses including updating all modeling to reflect the most recent year of emissions and meteorological data (2015) that was not available at the time of our initial recommendations. We also utilized the most recent version of EPA's dispersion model and processors to take advantage of improvements made in the most recent version (version 15181).

Our original area recommendations and the associated modeling files are available on our webpage: http://dnr.mo.gov/env/apcp/naaqsboundarydesignations.htm#SO2. The changes made to the previously submitted modeling are outlined in this technical documentation. Excerpts of updated modeling files are included in Attachment 3. The modeling performed for this updated technical support adheres to the modeling protocol submitted with the original recommendations.

There has been a general decrease in SO_2 emissions nationwide due to the implementation of other federal regulations that have affected the highest SO_2 emitters. Therefore it is not surprising that updating our modeling to include 2015 emissions does result in a slight decrease in modeled impacts in most cases. As detailed in EPA's February 2016 draft, *SO_2 NAAQS Designations Modeling Technical Assistance Document* (TAD), the goal of modeling for designation purposes is to approximate actual conditions as if a monitor were present and had three years of quality assured data (an approximate design value) to compare to the standard for compliance determination.

Attainment Area Recommendations:

Sikeston Power Station

For the area surrounding the Sikeston Power Station (Sikeston), the air program reaffirms the recommendation of an attainment designation for Scott County. EPA has indicated they agree with Missouri's proposed area boundaries and attainment classification[1]. The previously submitted modeling has been updated to reflect the most recent emissions and meteorological data, 2013 through 2015. The resulting approximate design value for the area still demonstrates

[1] EPA has reviewed the state's assessment, supporting documentation, and all available data. EPA agrees that the area is attaining the standard and intends to designate Scott County as unclassifiable/attainment.

compliance with the standard at 96 µg/m^3 (or 37 ppb). The analysis further supports the recommended attainment designation for Scott County.

Sibley Generating Station

For the area surrounding the Sibley Generating Station (Sibley), the air program reaffirms the recommendation of an attainment designation for a portion of Jackson County. EPA has indicated they agree with Missouri's proposed area boundaries, but has modified Missouri's recommendation of attainment to unclassifiable. The previously submitted modeling has been updated to reflect the most recent emissions and meteorological data, 2013 through 2015. The resulting approximate design value for the area still demonstrates compliance with the standard at 189 µg/m^3 (or 72.7 ppb), and supports an attainment designation.

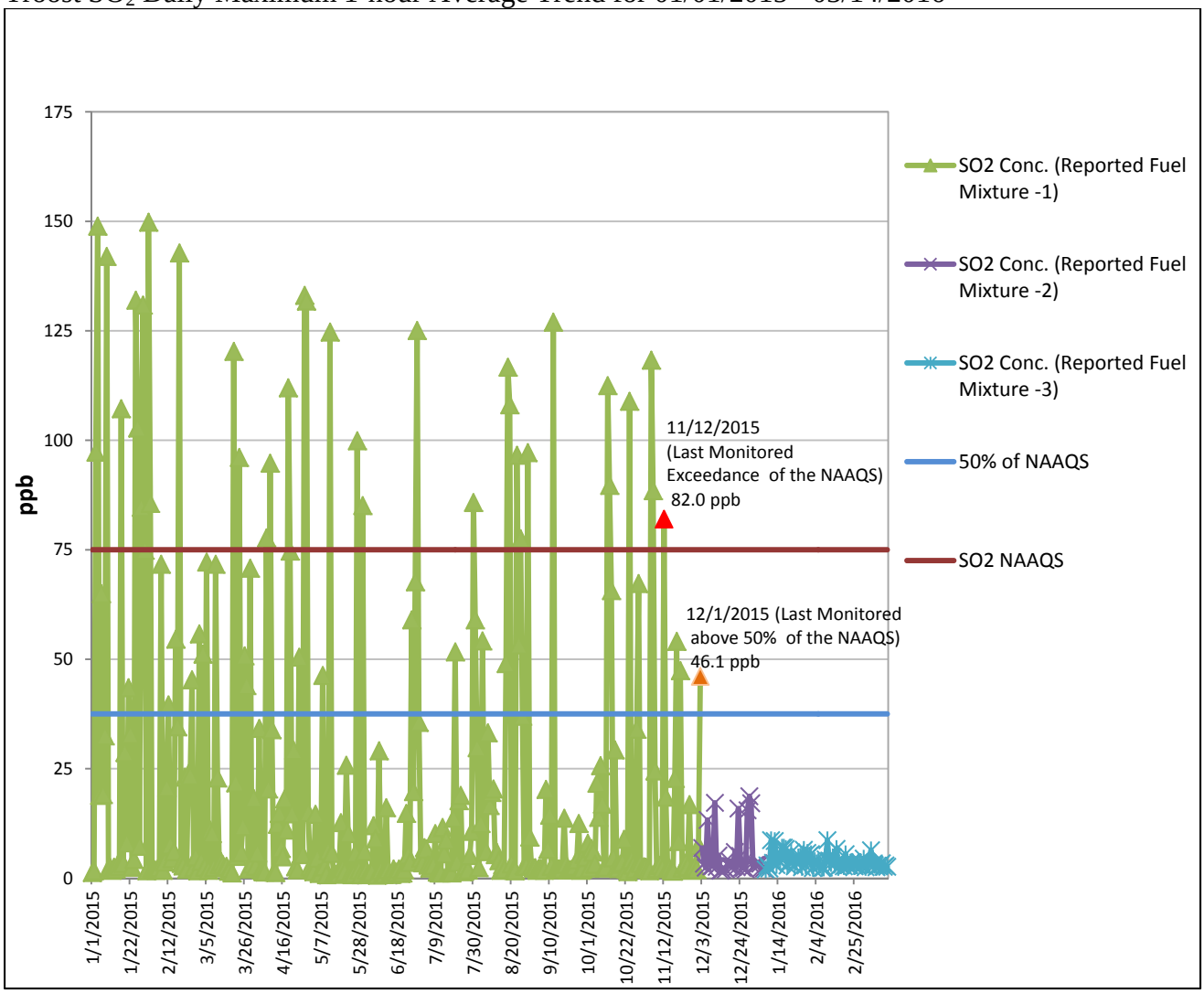
EPA voiced concern regarding three sources in the vicinity of the Sibley plant that could potentially interfere with attainment: the Veolia Energy steam plant (Veolia), the Blue Valley plant, and the Missouri City plant. As mentioned in the original recommendations, the Veolia plant is being addressed through Missouri's Jackson County nonattainment area (NAA) plan (submitted to EPA on October 9, 2015). The main control strategy of the Jackson County NAA plan is the new federally enforceable limit for the Veolia plant. As indicated in EPA's letter, Veolia's historical emissions do model violations, but the new limitations set through the NAA plan demonstrate compliance with the standard. The new limits have a compliance date of January 1, 2017, per EPA's April 2014 *Guidance for 1-hour SO_2 Nonattainment Area SIP Submissions*. EPA's concern that this compliance date occurs after this round's designation date of July 2, 2016 is the reason Veolia was included in Sibley's modeling analysis as an interactive source at their actual emission rates as reported in 2014. This is despite the fact the actual emission rates are approximately 80% higher than the new emission limits. It should be noted that modeling the higher emission rates for Veolia does not cause modeled violations within the attainment area boundary proposed for the Sibley plant.

Furthermore, the air program has evaluated monitoring value trends at the nearby Troost monitor. Recent fuel mixture changes at the Veolia plant have had an apparent effect on the latest Troost monitor values, as shown in the figure below. Since December 2015, the Veolia plant has reportedly changed fuel combustion mixtures. Previously, Veolia primarily burned a mixture of 95% coal/5% Natural Gas. On December 3, 2015, Veolia reportedly began burning a mixture of 80% Natural Gas/15% Coal due to the low cost of natural gas and to reduce their coal inventory. The Veolia plant has reportedly been burning 100% natural gas since January 7, 2016 due to the continued low price of natural gas. Veolia plans to continue burning 100% natural gas unless it becomes cost prohibitive in which case they will resume burning coal until their new emission limits become effective.

In the figure below, the last monitored exceedance and the last monitored value above 50% of the NAAQS are depicted. The chart indicates a strong correlation between decreases in monitored values and the recent changes in Veolia's fuel mix as discussed above. This not only strongly indicates that the Jackson County nonattainment area will demonstrate compliance by the attainment date but also that the Veolia plant will not interfere with attainment around the Sibley plant. Attachment 2 includes a table of recent monitoring values for all Missouri's SO_2

monitors including Troost. As of April 4, 2016, the 99th percentile 1-hour average for Troost in 2016 is 7 ppb, which is a drastic decrease from the 99th percentile 1-hour average for 2015 of 142 ppb.

Troost SO_2 Daily Maximum 1-hour Average Trend for 01/01/2015 - 03/14/2016



The Blue Valley plant was included in Sibley's modeling analysis as an interactive source at natural gas combustion emission rates. EPA's concern regarding the Blue Valley plant is that those emission rates were not federally enforceable at the time of our recommendations, even though Blue Valley had already switched to exclusively burning natural gas. In an email dated September 30, 2015, the Blue Valley Environmental Program Supervisor confirmed the fuel combustion changes reflected in the facility's permit renewal as submitted June 17, 2015. Blue Valley's three primary units were built to be tri-fuel units (oil, natural gas, and coal), and are subject to federal regulations. Units 1 & 2 are subject to the Industrial Boiler Maximum Achievable Control Technology (MACT) while Unit 3 is subject to the Mercury and Air Toxics Standard (MATS) which have compliance dates of January 31, 2016, and April 15, 2015,

respectively. The compliance strategy for these units as documented in their permit renewal is to cease burning coal and burn exclusively natural gas after January 31, 2016. Blue Valley emptied their coal reserves as of September 9, 2015, and indicated they do not intend to purchase more coal. This means that at the time of our original recommendations and with no coal reserves, the three Blue Valley units were already effectively only natural gas units. The federal regulations provide the enforceability to Blue Valley's documented early switch to exclusively burning natural gas. Together these points demonstrate that the Blue Valley plant will not interfere with attainment around the Sibley plant.

Lastly, the Missouri City plant was not included in Sibley's modeling analysis as an interactive source as they have reportedly shut down. The Missouri City plant ceased burning coal effective January 31, 2016 in order to comply with the Industrial Boiler MACT. This compliance strategy was detailed in a City of Independence letter to the department dated July 1, 2014. Since the plant is not capable of burning natural gas, the cessation of coal burning effectively is the shutdown of the plant. This is reflected in our modeling analysis by excluding them as an interactive source. Since this plant is no longer emitting SO_2, it will not interfere with attainment around the Sibley plant.

Given these updates to our technical analysis and supporting information, we reaffirm our recommendation of attainment for the portion of Jackson County containing the Sibley plant.

Unclassifiable Area Recommendation:

Ameren Labadie Energy Center

For the area surrounding the Ameren Labadie Energy Center (Labadie), the air program reaffirms the recommendation of an unclassifiable area designation. EPA has indicated they agree with Missouri's proposed area boundaries, but has modified Missouri's recommendation of unclassifiable to nonattainment. The previously submitted modeling was updated to reflect the most recent emissions and meteorological data, 2013 through 2015. These model results further support an unclassifiable classification.

The air program performed two modeling scenarios to characterize the air quality around the Labadie facility. In the first scenario, the only change made to the modeling submitted with our original recommendation was to include 2015 hourly emissions and meteorological data. This scenario resulted in a decrease in the approximate design value of the area from 234 $\mu g/m^3$ (or 90 ppb) to 201 $\mu g/m^3$ (or 77 ppb). In the second scenario, units 3 and 4 were modeled as a single release, or merged plume, as described below. This resulted in an approximate design value of 175 $\mu g/m^3$ (or 67 ppb) which is in compliance with the 1-hour standard of 75 ppb.

Two EPA Model Clearinghouse Information Storage and Retrieval System records (MCHISRS), 91-II-01 [2]and 96-V-10[3] describe situations in which multiple stacks/flues were allowed to be

[2] *91-II-01*, EPA Model Clearinghouse Information and Storage Retrieval System: EPA Region II Correspondence re NJ PSD Source, August 1990.
https://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=91-II%20%20-01

treated/modeled as a single source. Units 3 and 4 at Labadie are vented through two flues contained in a singular outer annulus or stack. This fits the description in the records of a multi-flued stack that could be treated as a single source. In addition, EPA Region VII has indicated that treating the flues as one stack is reasonable for designation purposes in order to approximate actual dispersion conditions. To be complete, both scenarios, where the flues are modeled separately and as a single source, are included in this analysis.

As described in the two referenced EPA records, it is reasonable to treat multi-flued stacks as a single source in most cases. When modeled as a single source the flow parameters are combined. A general guideline is if the flues/stacks are closer together than their respective widths/diameters then they may be treated as a single source. This is based upon the logic laid out in the GEP stack height guideline regarding treating buildings that are closer than their individual widths as a single building when using the stack height formula.

The air program employed the below methodology when combining the flues. This facility-supplied approach was determined to be a reasonable method for accurately combining the flues' release parameters.

1) Emission rate: The emission rate for Unit 3 and Unit 4 were summed.
2) Temperature: The combined temperature for Units 3 and 4 was calculated from the weighted average of the: (Unit 3 temperature * Unit 3 velocity) + (Unit 4 temperature * Unit 4 velocity) / (Unit 3 velocity + Unit 4 velocity)
3) Velocity: The combined velocity for Units 3 and 4 was calculated from the: sum of the Unit 3 and 4 velocities * (pi * (6.25 (single flue diameter)^2) / (pi * 8.84 (equivalent dual flue diameter)^2)

In addition to these two modeling evaluations of the Labadie facility, preliminary data from new ambient SO_2 monitors near the plant is available. Since the start of operation in April 2015, these monitors have been measuring SO_2 concentrations below the 1-hour SO_2 standard of 75 ppb. The state statute, Section 643.650, RSMo, (SB 445 and HB 92 from the 2015 legislative session), which became effective August 28, 2015, directs the department to consider SO_2 monitoring data for sources that choose to monitor to characterize their air quality. Though the dataset from Labadie's new SO_2 monitors is not yet complete, it further supports the unclassifiable designation for the area and we must consider it, consistent with state law. Attachment 2 includes a table of recent monitoring values for all Missouri's SO_2 monitors including the two newly sited monitors near Labadie, the Valley and Northwest sites.

Because it cannot be determined with certainty based on available information whether the area is or is not meeting the 1-hour SO_2 standard, the air program again recommends an unclassifiable designation for the area near Labadie.

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[3] *96-V-10*, EPA Model Clearinghouse Information and Storage Retrieval System: EPA Region V Correspondence re Ohio Bubble, August 1996.
https://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=96-V%20%20%20-10